AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A method for increasing the signal to noise ratio of a <u>broadband</u> receive wire-line system, said method comprising:

receiving receive signals from a wire-line, <u>wherein the receive signals comprise a continuous broadband frequency spectrum</u>;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the received signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming at least one matrix digitally representing a plurality of values, the values consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on data contained in the matrix, <u>wherein the iterative process converges</u> to ~~determine~~ an estimate of the magnitude and polarity of ~~the~~ <u>a primarily</u> noise portion of the signal-plus-noise for each trial; and,

subtracting each estimated noise value from the stored signal-plus-noise version to obtain a noise-reduced signal,

wherein the noise-reduced signal is a broadband signal exhibiting a reduction in ~~any type~~ ~~of~~<u>the overall system</u> noise.

2. (original): A method as claimed in claim 1 further comprising:

forming left and right topological groupings of digital numbers about a topocentric

reference that corresponds to a zero voltage injection from pre-programmed and memorized

voltage value injection patterns that comprise incremental successively increasing positive and

negative steps in each of a plurality of rows, each row having similar increments with the same

topocentric zero reference.

3. (original): A method as claimed in claim 1 further comprising:

using a topographic digital number array, that covers a positive and negative (i.e. bipolar)

range and is in equilibrium about a topocentric value, to detect when the polarity of the noise

portion of a signal-to-noise combination changes from positive to negative or from negative to

positive in response to an injection of a predetermined value probe.

4. (currently amended): A method as claimed in claim 1, wherein said iterative

processing comprises:

sequentially applying a series of digital ~~value probes~~values to said data to alter a value

representing signal-plus-noise and wherein several iterations produce an estimate of a noise only

portion of the signal-plus-noise by algebraically summing resultant values of the several iterative

steps.

5. (withdrawn): An iterative value programmer operable to provide digital value steps, or

probes, used in conjunction with a sensor operable to sense a change caused by each step or

probe in a bipolar fashion, wherein an amount of said change is determined for both positive and

negative values of a noise component of signal-plus-noise samples in a symmetric fashion.

6. (currently amended): A method as claimed in claim 4, further comprising:

providing at least one of the rows of the matrix that is ~~reserved~~ reversed in a pre-

programmed manner such as to cover the column injectors from minus to plus.

7. (original): A method as claimed in claim 2, further comprising:

forming a topographical number array rendered in equilibrium, and symmetrical about

the topocentric zero reference, by shifting a row of the array corresponding to a signal-to-noise

entry that has a minimum deviation of said entry from the average of the two or more entries,

such average referenced as a first row and these two aforementioned rows having the plus and

minus increment patterns reversed with respect to each other.

8. (original): A method as claimed in claim 1, further comprising

providing a processing means for performing said iterative processing wherein bandwidth

and signal handling capabilities of the system are not adversely compromised and wherein a time

delay of said processing means is short with respect to said method; and

utilizing the short time delay to permit signal-to-noise to be significantly improved.

9. (currently amended): A method as claimed in claim 4, further comprising:

providing time needed to perform the iterative process ~~by~~ thereby realizing means for achieving "near-real time" behavior of the sensing system by executing the iterations at a ~~slower~~ faster rate than the basic receipt of signal information, which corresponds to the "Nyquist" sampling rate, which is in accordance with the signal modulation characteristics, such iterative process having several iterations accomplished at a fast processing speed, wherein the iterations occur while the received samples are stored and remembered while the several iterations take place and wherein the desired relative processing speed is controlled by the division of the sampling frequency as determined by an ~~advisor~~ divisor ratio, thereby achieving a prescribed known rate and a fixed tolerable time delay.

10. (previously presented): An apparatus operable to accomplish the method of claim 4 wherein sensing and control abilities of the topographical number array are needed to execute the converging iterative process, said apparatus being enabled by the delay and storage features that maintain the sign apportion of this process constant so as to render the variations that occur from one iterative to the next one to consist primarily of the noise changes.

11. (withdrawn): An integrated circuit device comprised of means of performing primary simple functions namely digital addition (or subtraction) to form a topological array matrix consisting of two or more rows an a plurality of contiguous left hand, and right hand, columns which together with a means of utilizing column shifting (as controlled by a iterative programmer) so as to provide from the chip a "bipolar" means of sensing of the consequences of

each iterative probe value supplied by such a program with these consequences being interpreted equally well without regard for the net polarity of the noise portion of each signal-to-noise sample.

12. (withdrawn): An iterative programmer in accordance with claim 5, further comprising:

an integrated circuit device consisting of a chip, or a portion of a larger chip, that can interpret the response of each iterative probe to be used to help control said programmer so as to determine the magnitude and polarity of a subsequent probe, with each such decision made by a logic flow process.

13. (withdrawn): An iterative programmer in accordance with claim 5, further comprising:

an integrated circuit device consisting of one or more chips, or a portion of a large chip, operable to execute the series of steps that constitute the iterative process so as to converge in a manner that provides an accurate noise estimate for each trial in accordance with said iterative process.

14. (withdrawn): An integrated circuit devise on a chip, or group of chips, that hosts a specially structured numerical array or matrix as defined by claim 3 in which computed deviations form array values, which are signal level independent, are applied to one row of said

matrix in the form of a plus or minus column shift results in the matrix being in equilibrium about the topocentric (the zero column) of the array and thereby enduring the matrix with the ability to serve as a change detector to sense progressive changes as caused by a series of iterative probes.

15. (withdrawn): An integrated circuit chip as claimed in claim 14 that executes a logic flow guided by means of a decision tree and thus, in an orderly fashion, reduces six possible consequences to a single choice of one value for a subsequent iterative probe, such choice consisting of an appropriate magnitude and polarity.

16. (withdrawn): An integrated circuit chip, or aggregate of chips, that performs an iterative process by using iterative probes (magnitude and phase) where consequences are determined by the decision logic results of claim 1 in a series of iterative steps each assessed as to topological changes so as to resulting in selection of an appropriate next probe value to cause a series of iterations that converge to a near zero conclusion and providing an algebraic sum which is a close approximation tot he equivalent noise value, in digital form, which can be subtracted from the signal-to-noise value of each trail.

17. (withdrawn): A device in accordance with claim 15, further comprising:

a decision device operable to augment the decisions made for the early iterations by coupling some of the results from later iteration results back to the decision processor possible

modifications in determining the magnitude of such iterative probe used in middle and later

iteration based on a cumulative history from such iterative process.

18. (withdrawn): A receive system consisting of an arrangement of devices in

accordance with claim 11, wherein said system further provides an output signal that is enhanced

considerably with respect to the inherent noise that is present without such devices and

arrangements and with such enhancement manifest in the strength of the carrier signal in a

communication system.

19. (withdrawn): A receive system in accordance with claim 18 further operable to

accommodate and interpret various forms of modulation of the carrier of said signal, such an

ability being achieved by a succession of frames of information that are generated in near-real

time to retrieve the modulated signal information that is less corrupted by said noise.

20. (withdrawn - currently amended): A receive system in accordance with claim 19,

further comprising:

an integrated circuit device capable of providing said frames of information to work in

one or more pairs to form a paralleled processing arrangement in which separately remembered

signal frame(s) can be captured and stored simultaneously so that the output of each can be

utilized individually and serially to contract the desired noise-reduced signal by successive

frames that provide the modulation characteristics of the sequence, all of this being done in a

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tolerably short and predetermined fixed time which is manifested as signal delay, without

~~comprising~~ compromising bandwidth.

21. (original): A method as claimed in claim 8, further providing a practical

implementation of a non-stationery series of events that are executed in non-real time by an

iterative probe and unique bipolar sensing method that result in improving the entropy of the

system.

22. (original): A method as claimed in claim 1 further comprising:

implementing a comprehensive method of realizing near-real time processing that

satisfies the "second law" of thermodynamics by achieving, during a tolerable known time

departure (i.e. fixed "time delay") from real time, an estimate of the noise portion of the signal

plus noise of said iterative process, said estimate serving as a statistical mechanic results such

that when such a quantity is subtracted, it is analogous to an introduction of energy at a lower

temperature in a thermal system, thereby improving (i.e. lowering) the effective entropy of each

trial.

23. (withdrawn): Means of enhancing signal outputs provided from a gateway of a

service provider, such enhanced outputs being provided in a digital format as a result of an

overall iterative process which substantially lowers an amount of internal noise normally present

with the signal, such enhancement being able to improve a next process that receives such a

signal to improve a source error rate, a realizable channel density and a multiplexing

performance used to route information.

24. (withdrawn - currently amended): A device operable to enhance signals received at

gateways that are part of a localized distribution area in a form that are in packets (with

destination labels) in which such digital information is changed to analog ~~from~~ form (with

decompression if necessary) and converted with a digital to analog device to reconstruct an

analog signal which is then converted to digital from by processing where both the signal and the

locally generated noise are present in an interwoven combination to which an iterative

processing scheme is applied to provide further relative enhancement of the signal by

minimizing such noise.

25. (withdrawn): The device as claimed in claim 24 further comprising:

an interpreter operable to interpret the digitally represented signal more reliably and with

a lower error rate, wherein enhanced performance results which can be traded-off for the same

acceptable error rate to translate the improvement for higher channel density and/or longer range

reception.

26. (currently amended): A method as claimed in claim 1 wherein said method enhances

the receive signal at a gateway of an individual user, such improvement consisting of a stronger

signal, relative to noise, at a user end of the overall process providing a longer communication

distance ~~and/or~~, quicker access time ~~potential~~, or both a longer communication distance and quicker access time.

27. (withdrawn): A method of realizing a cascading multiple stage improvement of an overall information control and distribution system using signal-to-noise improvement manifested in a variety of embodiments based in principals as described for the invention in the various forms herein the aggregated overall improvements potential can be used to help optimize the overall, as well as the individual subsystems parts, or the overall system in a way that can improve performance parameter such as channel capacity, shorter access time, better range and reliability, that are achieved in part by the increased multiplexing options.

28. (previously presented): A method for increasing the signal to noise ratio of a receive system, said method comprising:

receiving receive signals;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the receive signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming a topological number array (TNA) for at least two successive trials of receive signals, wherein the TNA contains data consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on the data contained in the TNA to determine an

estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for each trial,

wherein the iterative process consists at least of successively adding a series of equally spaced

values to the data and determining a particular value that causes the noise portion to change

polarity; and

subtracting each estimated noise value from the stored signal-plus-noise version to obtain

a noise-reduced signal.

29. (currently amended): A receive system comprising:

means for ~~employing~~ receiving signals across an entire ~~a~~-wide continuous system

bandwidth ~~by providing additional~~ to provide increased system noise resulting in an increased

total bandwidth to accommodate ~~additional~~ a plurality of communication channels, and for

improving the reception of pulsed signals,

wherein the increased total bandwidth provides broadband noise that can be processed

rapidly using rapidly changing noise samples.

30. (currently amended): A method as claimed in claim 4, further comprising:

selecting one of several surrogate values ~~the probes~~ such that the largest signal-to-noise

improvement is achieved; and

performing the estimation of the noise portion of the signal-plus-noise for each of ~~a~~

~~plurality of~~ one or more cycles of a carrier signal associated with the receive signals.

31. (currently amended): A method as claimed in claim 30, wherein the receive signals are provided in a modulated form ~~and~~ so that a demodulated result signal is formed based on the selected probe.

32. (previously presented): A method as claimed in claim 1 further providing:

providing a time delay required such that the iterative process can be performed substantially in real time for each cycle of a carrier signal of the receive signal, wherein signal modulation is achieved such that the Nyquist criterion is satisfied for the modulation.

33. (previously presented): A method as claimed in claim 32, wherein the signal modulation comprises phase modulation.

34. (previously presented): A method as claimed in claim 32, wherein the iterative process on each cycle is performed on samples that have been stored.

35. (currently amended): A method for increasing a signal-to-noise ratio in a receive system comprising providing a sequence of at least two related iterative processes, ~~one~~ each related to a single receive signal of the receive system and ~~one related to~~ a noise sampling, the iterative processes comprising:

providing a <u>respective</u> series of signal level assumptions (probe values) for each <u>of the</u>

iterative ~~process~~<u>processes</u>;

deriving an equivalent noise level by using a digital iterative noise estimation process,

wherein the noise estimates are determined by algebraically summing several iterative digital

values such that a cumulative sum becomes a close approximation to the actual value of the

noise, but with the polarity reversed.

36. (currently amended): A method as claimed in claim 35, further comprising:

determining an appropriate signal level by selecting a sample that provides a maximum

signal-to-noise output, wherein ~~both a positive and negative half cycle of~~ a carrier signal

~~sinewave~~ is used to determine which signal sample corresponds to a minimum residual noise

effect and wherein the value of the minimum residual noise effect corresponds to a maximum

signal-to-noise result.

37. (currently amended): A method of increasing signal-to-noise in a receive system

comprising:

utilizing ~~adjacent positive and negative half cycles of~~ a carrier signal to determine a ~~cycle~~

~~match in which the positive half cycle amplitude matches the negative half cycle~~

~~amplitude~~<u>plurality of noise estimates</u>;

identifying a zero signal condition which corresponds to an optimum noise estimate from

among ~~a~~<u>the</u> plurality of noise estimates.

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38. (previously presented): A method as claimed in claim 1, wherein the iterative process is performed for each cycle of a carrier signal as determined by a carrier frequency phasing with reference to a zero phase reference, resulting in a small predictable delay.

39. (previously presented): A method as claimed in claim 38, wherein the noise estimate is obtained from one complete cycle of the carrier for a pulsed signal and the receive signal corresponds to an absence of carrier and the noise is reduced to a residual value providing the ability to detect each pulse of the signal.

40. (new): A method for increasing the signal to noise ratio of a receive wire-line system, said method comprising:

receiving receive signals from a wire-line;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the received signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming at least one matrix digitally representing a plurality of values, the values consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on data contained in the matrix to determine an estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for each trial;

subtracting each estimated noise value from the stored signal-plus-noise version to obtain

a noise-reduced signal, wherein the noise-reduced signal is a broadband signal exhibiting a

reduction in a value of the overall system noise; and

forming left and right topological groupings of digital numbers about a topocentric

reference that corresponds to a zero voltage injection from pre-programmed and memorized

voltage value injection patterns that comprise incremental successively increasing positive and

negative steps in each of a plurality of rows, each row having similar increments with the same

topocentric zero reference.

41. (new): A method as claimed in claim 40, further comprising:

forming a topographical number array rendered in equilibrium, and symmetrical about

the topocentric zero reference, by shifting a row of the array corresponding to a signal-to-noise

entry that has a minimum deviation of said entry from the average of the two or more entries,

such average referenced as a first row and these two aforementioned rows having the plus and

minus increment patterns reversed with respect to each other.

42. (new): A method for increasing the signal to noise ratio of a receive wire-line system,

said method comprising:

receiving receive signals from a wire-line;

amplifying the receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of the received signals, wherein the in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing the signal-plus-noise signals in a memory device;

forming at least one matrix digitally representing a plurality of values, the values consisting of the in-phase and quadrature versions of the receive signals;

performing an iterative process on data contained in the matrix to determine an estimate of the magnitude and polarity of the noise portion of the signal-plus-noise for each trial;

subtracting each estimated noise value from the stored signal-plus-noise version to obtain a noise-reduced signal, wherein the noise-reduced signal is a broadband signal exhibiting a reduction in a value of the overall system noise; and

using a topographic digital number array, that covers a positive and negative (i.e. bipolar) range and is in equilibrium about a topocentric value, to detect when the polarity of the noise portion of a signal-to-noise combination changes from positive to negative or from negative to positive in response to an injection of a predetermined value probe.

43. (new): A method as claimed in claim 28 further comprising:

forming left and right topological groupings of digital numbers about a topocentric reference that corresponds to a zero voltage injection from stored voltage value injection patterns that comprise incremental successively increasing positive and negative steps.

44. (new): A method as claimed in claim 28 further comprising:

using a topographic digital number array, that covers a positive and negative (i.e. bipolar)

range and is in equilibrium about a topocentric value, to detect when the polarity of the noise

portion of a signal-to-noise combination changes from positive to negative or from negative to

positive.

45. (new): A method as claimed in claim 28, wherein the iterative process comprises:

sequentially applying a series of digital values to the data to alter a value representing

signal-plus-noise and wherein several iterations produce an estimate of a noise only portion of

the signal-plus-noise by algebraically summing resultant values of the several iterations.

46. (new): A receive system comprising:

a receiver operable to simultaneously receive signals from across an entire continuous

broadband frequency spectrum, wherein reception in the continuous broadband frequency

spectrum provides an increased amount of system noise resulting in an increased total bandwidth

to accommodate a plurality of communication channels, and for improving the reception of

pulsed signals,

wherein the increased total bandwidth provides broadband noise that can be processed

rapidly using rapidly changing noise samples.

47. (new): A receive system as claimed in claim 46 further comprising:

an iterative processor operable to iteratively process data representing the receive signals

and stored in an array, and further operable to determine an estimate of a magnitude and polarity

of a noise-only portion of a signal-plus-noise version of the receive signals.

48. (new): A receive system as claimed in claim 47, wherein the iterative process consists

at least of successively adding a series of equally spaced values to the data and determining at

least one of the equally spaced values that causes the noise-only portion to change polarity.

49. (new): A receive system as claimed in claim 46, further comprising a subtraction unit

operable to subtract the estimated noise values from the signal-plus-noise version to obtain a

noise-reduced signal.